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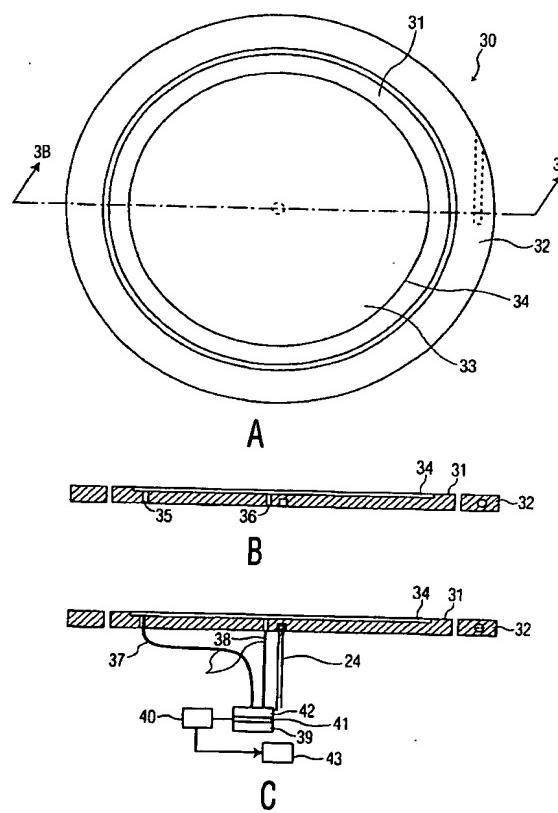
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(10) International Publication Number  
WO 2004/053946 A2

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- (21) International Application Number: PCT/IB2003/005447 (74) Common Representative: KONINKLIJKE PHILIPS ELECTRONICS N.V.; c/o Waxler, Aaron, P.O. Box 3001, Briarcliff Manor, NY 10510-8001 (US).
- (22) International Filing Date: 26 November 2003 (26.11.2003) (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (25) Filing Language: English (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO,
- (26) Publication Language: English
- (30) Priority Data: 60/431,841 9 December 2002 (09.12.2002) US
- (71) Applicant (for all designated States except US): KONINKLIJKE PHILIPS ELECTRONICS N.V. [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): DE BOER, Wiebe

[Continued on next page]

(54) Title: SYSTEM AND METHOD FOR SUPPRESSION OF WAFER TEMPERATURE DRIFT IN COLD-WELL CVD SYSTEM



(57) Abstract: An apparatus and corresponding method are disclosed that uses one or more optical fibers in a susceptor that monitor radiation emitted by the backside of the susceptor. The optical fibers are filtered and converted into an electrical signal. A control system is used to maintain a constant wafer temperature by keeping the electrical signal constant during the deposition cycle. This overcomes problems caused by varying wafer temperature during non-selective epitaxial and poly-silicon growth on patterned wafers at low temperatures and reduced pressure.

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SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Published:**

— without international search report and to be republished upon receipt of that report

**Declaration under Rule 4.17:**

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for all designations

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

**PCT REQUEST**

Original (for SUBMISSION) - printed on 20.11.2003 02:06:03 PM

VIII-2-1	<p><b>Declaration: Entitlement to apply for and be granted a patent</b></p> <p>Declaration as to the applicant's entitlement, as at the international filing date, to apply for and be granted a patent (Rules 4.17(ii) and 51bis.1(a)(ii)), in a case where the declaration under Rule 4.17(iv) is not appropriate:</p> <p>Name:</p>	<p><b>in relation to this international application</b></p> <p><b>KONINKLIJKE PHILIPS ELECTRONICS N.V.</b> <b>is entitled to apply for and be granted a patent by virtue of the following:</b></p>
VIII-2-1 (ii)		<b>KONINKLIJKE PHILIPS ELECTRONICS N.V. is entitled as employer of the inventor, DE BOER, Wiebe</b>
VIII-2-1 (ix)	This declaration is made for the purposes of:	<b>all designations</b>

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(43) International Publication Date  
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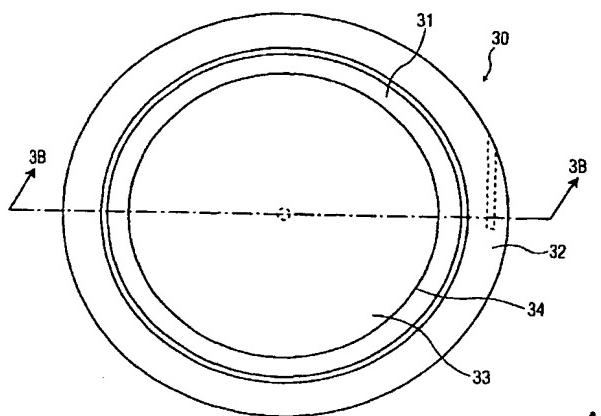
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- (51) International Patent Classification<sup>7</sup>: **H01L 21/00**
- (21) International Application Number: PCT/IB2003/005447
- (22) International Filing Date: 26 November 2003 (26.11.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: 60/431,841 9 December 2002 (09.12.2002) US
- (71) Applicant (for all designated States except US): **KONINKLIJKE PHILIPS ELECTRONICS N.V. [NL/NL]**, Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): **DE BOER, Wiebe**
- (74) Common Representative: **KONINKLIJKE PHILIPS ELECTRONICS N.V.**; c/o Waxler, Aaron, P.O. Box 3001, Briarcliff Manor, NY 10510-8001 (US).
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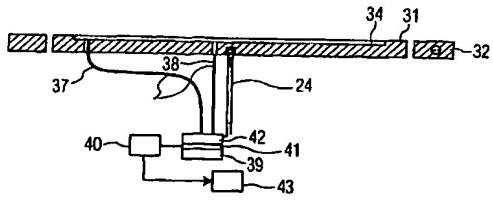
(54) Title: SYSTEM AND METHOD FOR SUPPRESSION OF WAFER TEMPERATURE DRIFT IN COLD-WALL CVD SYSTEM



A



B



C

(57) Abstract: An apparatus and corresponding method are disclosed that uses one or more optical fibers in a susceptor that monitor radiation emitted by the backside of the susceptor. The optical fibers are filtered and converted into an electrical signal. A control system is used to maintain a constant wafer temperature by keeping the electrical signal constant during the deposition cycle. This overcomes problems caused by varying wafer temperature during non-selective epitaxial and poly-silicon growth on patterned wafers at low temperatures and reduced pressure.



SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

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(88) Date of publication of the international search report:  
17 March 2005

**Published:**

- with international search report

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# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/IB 03/05447

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 H01L21/00

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 H01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 01/50109 A (TOKYO ELECTRON LIMITED) 12 July 2001 (2001-07-12) figures 4,6 page 11, lines 7-15 page 17, lines 1-9	1,2,4,7, 11,12
Y A	-----	13,14 9
X	US 6 200 634 B1 (JOHNSGARD ET AL.) 13 March 2001 (2001-03-13) column 8, lines 43-45 column 11, lines 49-51 column 12, lines 49-51 column 18, lines 26,27	1,5,8,9, 11
Y A	----- -----	10 12
		-/-

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

\* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

8 June 2004

Date of mailing of the international search report

26.01.2005

Name and mailing address of the ISA

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Oberle, T

## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/IB 03/05447

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 02/065521 A (TOKYO ELECTRON LIMITED) 22 August 2002 (2002-08-22) abstract	1,2,7,11
Y A	-& EP 1 367 637 A (TOKYO ELECTRON LIMITED) 3 December 2003 (2003-12-03) paragraphs [0064], [0066]; figure 8 -----	13,14 12
Y	US 6 146 242 A (TREUR ET AL.) 14 November 2000 (2000-11-14) column 5, lines 1-5	10
A	-----	1,12

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-14

Method and system for monitoring wafer temperature

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2. claims: 15-17

Method for decreasing temperature differences between wafers with different patterns or different thickness

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## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/IB 03/05447

### Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.: because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.: because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
  
3.  Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

### Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1.  As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
  
2.  As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
  
3.  As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
  
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-14

#### Remark on Protest

- The additional search fees were accompanied by the applicant's protest.  
 No protest accompanied the payment of additional search fees.

**INTERNATIONAL SEARCH REPORT**

International Application No  
PCT/IB 03/05447

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
WO 0150109	A	12-07-2001	AU JP TW WO	3084101 A 2003519380 T 505950 B 0150109 A2		16-07-2001 17-06-2003 11-10-2002 12-07-2001
US 6200634	B1	13-03-2001	US EP WO	5830277 A 0828999 A1 9637763 A1		03-11-1998 18-03-1998 28-11-1996
WO 02065521	A	22-08-2002	JP JP EP WO US	2002246318 A 2002367914 A 1367637 A1 02065521 A1 2004069234 A1		30-08-2002 20-12-2002 03-12-2003 22-08-2002 15-04-2004
EP 1367637	A	03-12-2003	JP JP EP US WO	2002246318 A 2002367914 A 1367637 A1 2004069234 A1 02065521 A1		30-08-2002 20-12-2002 03-12-2003 15-04-2004 22-08-2002
US 6146242	A	14-11-2000	AU JP TW WO US	5480700 A 2003501845 T 442362 B 0076725 A1 6488568 B1		02-01-2001 14-01-2003 23-06-2001 21-12-2000 03-12-2002